7-2: Students will demonstrate an understanding of the structure and function of cells, cellular reproduction, and heredity. (Life Science)

Key Concepts:
Cell Structure: cell wall, the cell membrane, the nucleus, chloroplasts, mitochondria, vacuoles
Bacteria: spiral, coccus, bacillus
Protists: euglena, paramecium, amoeba, cilia, flagella, pseudopods
Cellular Processes: respiration, photosynthesis, elimination, metabolism, mitosis,
Genetics: genes,chromosomes, inherited traits, genotype, phenotype, dominant traits, recessive traits

Supporting Content Web Sites

"How Are Traits Inherited"
http://biology.wsc.ma.edu/hoagland/PowderMillI/heredtrait.htm This describes cell division and heredity with explanations of genes, chromosomes, and alleles. It also includes an animation of mitosis and meiosis.
7-2.7

"Cells Alive"
www.cellsalive.com
This site contains interactive pictures of plant and animal cells, descriptions of cell parts, and information about bacterial cells.
7-2.1, 7-2.2, 7-2.3

"Protozoa and Protists"
http://www.uga.edu/protozoa/education/students/for_students_sop_web_ora.doc

This site describes food getting and locomotion of protists. It also includes pictures and links to other sites.
7-2.3

"Plant Physiology: Photosynthesis, Respiration, and Transpiration"
http://www.ext.colostate.edu/pubs/garden/07710.html

This site describes photosynthesis and respiration and has a comparison table of both
7-2.4

"Photosynthesis: How Life Keeps Going"
http://www.ftexploring.com/photosyn/photosynth.html
This is an interesting site explaining the flow of energy in organisms. It has explanations and novel drawings.
7-2.4

"Working Out Punnett Square Examples"
http://www.athro.com/evo/gen/punexam.html
This site gives information about the "parents" and allows students to complete Punnett Squares online.
7-2.6

"Heredity, A Link to Your Past"
http://extension.usu.edu/AITC/teachers/elementary/heredity.html
This site contains lesson plans and resources for the student which include inherited and acquired traits.
7-2.7

"Genotype versus Phenotype"
http://evolution.berkeley.edu/evosite/evo101/IIIA1Genotypevsphenotype.shtml
This site explains the difference between phenotype and genotype and uses pictures to illustrate this.
7-2.5

"Microorganisms"
http://www.biology4kids.com/files/micro_main.html
This web site gives information about various protists and bacteria in a simple format.
7-2.3

"Basic Principles of Genetics"
http://anthro.palomar.edu/mendel/
This site provides information about Mendel, probability, Punnett Squares, (do not address exceptions) and has links, and a puzzle.
7-2.5, 7-2.6, 7-2.7

Suggested Literature

Fridell, R. (2004). *Decoding life: unraveling the mysteries of the genome.*
Lerner Publishing Group
ISBN: 0-8225-1196-7
This book provides an overview of modern genetics from Mendel to genetic engineering. The Human Genome Project and its potential are discussed.
7-2.5, 7-2.6, 7-2.7

Walker, R. (2003). *Genes and DNA.* Kingfisher Knowledge.
ISBN: 0-7534-5621-4
The purpose of this book is to help students fully understand the complex concepts of DNA and genetics. It contains full color photographs and illustrations.
7-2.5

Kramer, S. (2001). *Hidden worlds: looking through a scientist's microscope.*
Houghton Mifflin
ISBN: 0-618-05546-0
This book uses many photos while discussing the hidden world revealed by a microscope. It brings "cells" to life for the reader.
7-2.2, 7-2.3

Walker, R. (2004). *Microscopic life.* Kingfisher Knowledge
ISBN: 0753457784
Bacteria are included in this book as it explores the small world around us.
7-2.3

Bailey, N., Eskeland, N. (2001) *Fun with gene*. Science2Discover, Inc.
ISBN: 0-9673811-3-4
Students will have fun with this book while learning about genetics and biotechnology. They will help to solve cases related to forensic science, genetic diseases, and agriculture.
7-2.5, 7-2.7

Nye, B. (2005). *Bill Nye the science guy's great big book of tiny germs.*
Hyperion Books for Children
ISBN: 0786805439
This book describes both "good" and "bad" germs including bacteria and viruses.
7-2.3

Balkwill, F. Rolph, M. (2002). *Enjoy your cells.* Cold Springs Harbor Press.
ISBN: 0879695846
In simple, but scientifically accurate, manner, this book takes students on an exploration of the hidden world of cells.
7-2.1, 7-2.2, 7-2.3

Thomas, L. (1995). *The lives of a cell: notes of a biology watcher.* Penquin Books.
ISBN: 0140047433
This is a collection of essays by the author that are well written and interesting. This would be more appropriate for higher level students.
7-2.1, 7-2.3

Woodard, K. (2004). *My first book about DNA.* Xlibris
ISBN: 1-4010-7816-8
This book provides information about DNA and genetics, simply, so that a child can understand it and even a parent can also.
7-2.5

Landa, N., Baeuerle, P. (1997). *The Y makes the guy.* Barrons:Hauppauge
ISBN: 076415064
This describes a trip that a group of students make with "Professor Gene" to learn about the structure and function of chromosomes, including X and Y, and information about DNA and RNA.
7-2.5

Suggested Streamline Video

"The Living Cell"
ETV Streamline SC
This video uses a game called "cell-ebrity-squares" to learn about the structure and functions of plant and animal cells.
20:00
7-2.1, 7-2.2

"Life Science: Bacteria"
"Introduction to Bacteria"
ETV Streamline SC
This provides an overview of bacteria including functions, locations, and effects.
2:44
7-2.3

"Bacteria: Friends or Enemies"
"Form and Function: Bacteria are the Simplest Organisms"
ETV Streamline SC
This describes the bacterial cell and its parts.
3:40
7-2.1

"Life Science: Cells"
"Introduction to Cells"
ETV Streamline SC
This video is an overview of cells which utilizes information from a scientist and animations and microphotographs of cell parts.
3:35
7-2.1

“Introducing the Cell”
ETV Streamline SC
This includes information on single celled organisms, basic cell parts, and the differences between plant and animal cells.
21:00
7-2.1, 7-2.2, 7-2.4, 7-2.5

“World of Protozoa”
“Feeding Styles of Protozoa”
ETV Streamline SC
This video shows various methods of feeding among protists.
4:26
7-2.3

“World of Protozoa:
“Movement of Protozoa”
ETV Streamline SC
This video shows the different methods of locomotion used by protists.
1:31
7-2.3

“Greatest Discoveries with Bill Nye: Genetics”
“The Basics of Genes”
ETV Streamline SC
This introduces inheritance through information about Mendel’s experiments. It, also, describes genes and chromosomes.
10:30
7-2.5

“Genes, Genetics and DNA”
“Gregor Mendel’s Rules of Heredity: Using Punnett Squares”
ETV Streamline SC
This presents information about heredity including dominate and recessive traits.
5:04
7-2.6

“Genes, Genetics, and DNA”
“Practice Makes Perfect: Maximizing Your Inherited Traits”
ETV Streamline SC
This illustrates and explains ways to enhance certain traits.
1:32
7-2.7

Career Connections

Biomedical Engineer-researches and develops new ways to help people who are handicapped because of the malfunction of some organ of the body.

Biophysicist- studies the physical principles within living cells and organisms.

Geneticist- studies the process of inheritance to attempt to determine what causes different traits and inherited disorders.

Microbiologist- investigates microscopic organisms such as bacteria, viruses, algae, yeasts, and molds. These scientists try to discover how these organisms affect animals, plants and the environment.

Genetic Counselor- provides information and support to families whose members may have or are at risk of having various genetic conditions.

Cytotechnologist- stains, mounts, and studies cells of the human body to determine pathological conditions.

Clinical Cytogeneticist- processes and analyzes samples taken from patients in order to detect chromosome abnormalities.

Molecular Geneticist- carries out DNA analyses on samples taken from patients. Types of analyses include prenatal diagnosis and confirmation of diagnosis for patients with genetic disorders.

Cellular Biologist- deals with microbes (bacteria, viruses, and fungi) or with activities within cells o f multicellular organisms, usually microscopic.

Genetic Research Technician- assists in the laboratory of a geneticist in discovering new information about genetic disorders and other related areas.